
The Drawing Tools

3

Contents

| | |
|--|-----|
| About this Chapter | 3-1 |
| Key Terms in this Chapter | 3-2 |
| The Drawing Tools of CADD | 3-2 |
| Using Line Types | 3-2 |
| Drawing Multiple Parallel Lines | 3-3 |
| Drawing Flexible Curves | 3-3 |
| Drawing Arcs and Circles | 3-3 |
| Drawing Ellipses and Elliptical Arcs | 3-4 |
| Adding Text to Drawings | 3-4 |
| Defining a Text Style | 3-5 |
| Drawing Dimensions | 3-5 |
| Adding Hatch Patterns to Drawings | 3-6 |
| Drawing Symbols | 3-6 |
| Drawing Arrows | 3-6 |
| AutoCAD, MicroStation and Cadkey Terms | 3-6 |

The Drawing Tools

Note:

This condensed version of CADD PRIMER is intended to give you an overview of CADD. It includes only important topics from CADD PRIMER. It does not include any diagrams. CADD PRIMER includes more than 100 diagrams that illustrate the working of CADD. For complete understanding of CADD refer to CADD PRIMER. This complete book is available for download for \$9.95 at <http://www.caddprimer.com> or you can order printed copies through the publisher listed at the end of this chapter.

About this Chapter

This chapter focuses on the two-dimensional drawing functions of CADD. It describes in detail how to draw each element of a drawing. You will learn the unique characteristics of different drawing elements that make them suitable for specific drawing tasks.

In this chapter you will learn the following:

- *How to create line types such as dotted lines, dashed lines, multi-lines and splines.*
- *How to draw arcs, circles and ellipses.*
- *How to write text and dimensions with different styles and how to control various aspects associated with them such as size, fonts and units.*
- *How to make drawings presentable using drawing annotations such as symbols, arrows, borders and hatching patterns.*

Key Terms in this Chapter

| Term | Description |
|------------------------|---|
| Associative dimensions | A mode of dimensioning that automatically updates dimension values when the dimension size is changed. |
| Benchmark | A reference point from where all distances are measured. |
| Spline | A flexible curve that can be drawn to fit any shape. |
| Hatch patterns | Ready-made patterns that can be added to a specified area in a drawing. |
| Justification | The alignment of text strings in a specific direction such as to the right, left, or center. |
| Polyline | A string of lines that may contain a number of line segments connected together. |
| Tangent | A point on a circle that forms 90° angle between the center point of the circle and another point outside the circle. |

The Drawing Tools of CADD

The following are the basic drawing tools found in a CADD program:

- Line types
- Multiple parallel lines
- Flexible curves
- Arcs and circles
- Ellipses and elliptical arcs
- Text
- Dimensions
- Hatch patterns
- Polygons
- Arrows

Using Line Types

There are a number of line types available in CADD that can be used to enhance drawings. There are continuous lines, dotted lines, center lines, construction lines, etc. (Illustrated with Fig. In CADD PRIMER)

CADD enables you to follow both geometrical and engineering drawing standards. You can use line types to represent different annotations in a drawing. For example, an engineer can use line types to differentiate between engineering services in a building plan. One line type can be used to show power supply lines, while the others to show telephone lines, water supply lines and plumbing lines.

CADD is preset to draw continuous lines. When you enter the line command and indicate a starting point and end point, a continuous line is drawn. If you want to draw with another line type, you need to set that line type as the current line type. Thereafter, all the lines are drawn with the newly selected line type.

Drawing Multiple Parallel Lines

CADD allows you draw parallel lines simultaneously just by indicating a starting point and an end point. These lines can be used to draw something with heavy lines or double lines. For example, they can be used to draw the walls of a building plan, roads of a site map, or for any other presentation that requires parallel lines.

Most programs allow you to define a style for multiple parallel lines. You can specify how many parallel lines you need, at what distance and if they are to be filled with a pattern or solid fill. (Illustrated with Fig. In CADD PRIMER)

A number of add-on programs use multiple lines to represent specific drawing features. For example, an architectural program has a special function called "wall". When you use this option, it automatically draws parallel lines representing walls of specified style and thickness.

Note:

Multiple lines are a unified entity. Even though double lines are drawn, they are treated as one line. You cannot erase or edit one line separately. However, there are functions available that can break the entities apart.

Drawing Flexible Curves

CADD allows you to draw flexible curves (often called splines) that can be used to draw almost any shape. They can be used to create the smooth curves of a sculpture, contours of a landscape plan or roads and boundaries of a map.

To draw a flexible curve, you need to indicate the points through which the curve will pass. A uniform curve is drawn passing through the indicated points. The sharpness of the curves, the roughness of the lines and the thickness can be controlled through the use of related commands. (Illustrated with Fig. In CADD PRIMER)

Drawing Arcs and Circles

CADD provides many ways to draw arcs and circles. There are a number of advanced techniques available for drawing arcs and circles, which can simplify many geometrical drawing problems. You can draw an arc by specifying circumference and radius, radius and rotation angle, chord length and radius, etc.

Arcs are drawn so accurately that a number of engineering problems can be solved graphically rather than mathematically. Suppose you need to measure the circumference of an arc, just select that arc and the exact value is displayed.

*The following are basic methods for drawing arcs and circles:
(These are essentially the same methods you learn in a geometry class.
However, when drawing with CADD the approach is a little different.)*

- Center point and radius
- 3 points
- Angle and radius
- 2 points
- 2 tangents and a point
- 3 tangents

Note: The above topics are illustrated with Figs. in CADD PRIMER.

Drawing Ellipses and Elliptical Arcs

Ellipses are much easier to draw with CADD than on a drawing board. On a drawing board, you need to find the right size template or draw a series of arcs individually to draw an ellipse. With CADD, all you need to do is specify the size of the ellipse.

The following are two basic methods for drawing ellipses:

- Length and width
- Axis and rotation angle

Note: The above topics are illustrated with Figs. in CADD PRIMER.

Adding Text to Drawings

CADD allows you to add fine lettering to your drawings. You can use text to write notes, specifications and to describe the components of a drawing. Text created with CADD is neat, stylish and can be easily edited. Typing skills are helpful if you intend to write a lot of text.

Writing text with CADD is as simple as typing it on the keyboard. You can locate it anywhere on the drawing, write it as big or as small as you like and choose from a number of available fonts.

Note:

When large amounts of text are added to drawings, it slows down the screen displays. Many programs provide options to temporarily turn off text or to display text outlines only. This feature helps save computer memory and speeds up the display of screen images. The text can be turned back on whenever needed.

*The following are the basic factors that control the appearance of text:
(The exact terms and procedures used vary from one program to another.)*

- Text height
- Height to width ratio and inclination of letters
- Special effects
- Alignment of text (justification)
- Text fonts

Note: The above topics are illustrated with Figs. in CADD PRIMER.

Defining a Text Style

As discussed, there are a number of factors that control the appearance of text. It is time-consuming to specify every parameter each time you need to write text. CADD allows you to define text styles that contain all the text information such as size, justification and font. When you need to write text, simply select a particular style and all the text thereafter is written with that style. CADD offers a number of ready-made text styles as well.

Important Tip:

There are a number of add-on programs available that can make working with text faster and easier. These programs provide basic word-processing capabilities that can be used to write reports and make charts. They provide access to a dictionary and thesaurus database that can be used to check spelling and to search for alternative words.

Drawing Dimensions

CADD's dimensioning functions provide a fast and accurate means for drawing dimensions. To draw a dimension, all you need to do is to indicate the points that need to be dimensioned. CADD automatically calculates the dimension value and draws all the necessary annotations.

The annotations that form a dimension are: dimension line, dimension text, dimension terminators and extension lines (see fig.). You can control the appearance of each of these elements by changing the dimensioning defaults.

The following are the common methods for drawing dimensions:

- Drawing horizontal and vertical dimensions
- Dimensioning from a base line
- Dimensioning arcs and circles

- Drawing dimensions parallel to an object
- Dimensioning angles

Note: The above topics are illustrated with Figs. in CADD PRIMER.

Adding Hatch Patterns to Drawings

The look of CADD drawings can be enhanced with the hatch patterns available in CADD. The patterns can be used to emphasize portions of the drawing and to represent various materials, finishes, and spaces. Several ready-made patterns are available in CADD that can be instantly added to drawings.

Hatch patterns are quite easy to draw. You don't need to draw each element of a pattern one by one. You just need to specify an area where the pattern is to be drawn by selecting all the drawing objects that surround the area. The selected objects must enclose the area completely, like a closed polygon. When the area is enclosed, a list of available patterns is displayed. Select a pattern, and the specified area is filled. (Illustrated with Fig. In CADD PRIMER)

Drawing Symbols

Symbols provide a convenient way to draw geometrical shapes. You may compare this function with the multi-purpose templates commonly used on a drawing board. To draw a geometrical shape, such as a pentagon or hexagon, select an appropriate symbol from the menu, specify the size of the symbol, and it is drawn at the indicated point. (Illustrated with Fig. In CADD PRIMER)

Drawing Arrows

Arrows (or pointers) in a drawing are commonly used to indicate which note or specification relates to which portion of the drawing, or to specify a direction for any reason. There are several arrow styles available in CADD programs. You can choose from simple two-point arrows to arrows passing through a number of points, and from simple to fancy arrow styles. To draw an arrow, you need to indicate the points through which the arrow will pass. (Illustrated with Fig. In CADD PRIMER)

AutoCAD, MicroStation and Cadkey Terms

Refer to CADD PRIMER for important terms used in leading CADD programs.

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